DREDGED MATERIAL RESEARCH PROGRAM

TECHNICAL REPORT D-77-9

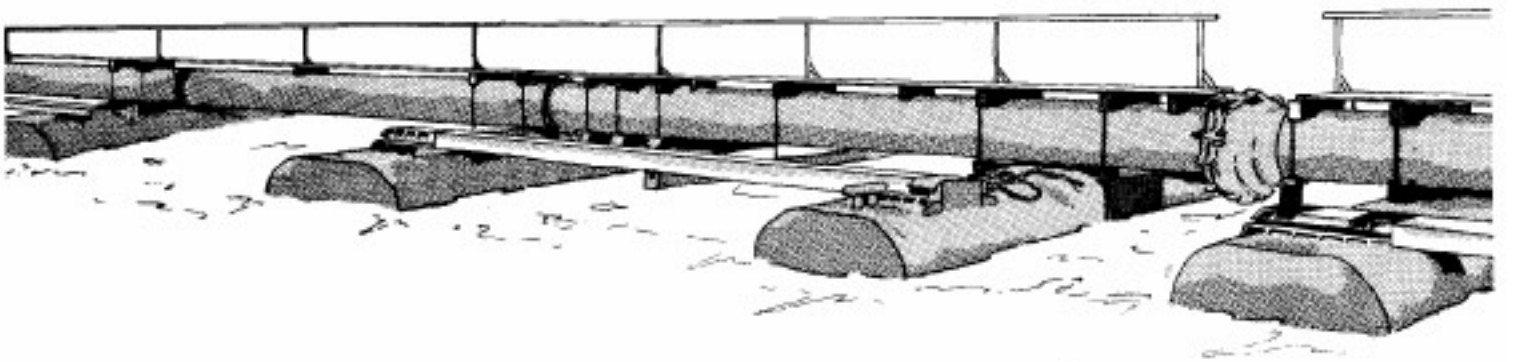
DESIGN AND CONSTRUCTION OF RETAINING DIKES FOR CONTAINMENT OF DREDGED MATERIAL

by

David P. Hammer and Edward D. Blackburn

U. S. Army Engineer District, Savannah
Soils Section
P. O. Box 889, Savannah, Georgia 31402

August 1977
Final Report



Prepared for Office, Chief of Engineers, U. S. Army
Washington, D. C. 20314

Monitored by Environmental Effects Laboratory
U. S. Army Engineer Waterways Experiment Station
P. O. Box 631, Vicksburg, Miss. 39180

Under Interagency Agreement No. WESRF 74-51
(DMRP Work Unit No. 2C04)

Destroy this report when no longer needed. Do not return it to the originator.

DEPARTMENT OF THE ARMY
WATERWAYS EXPERIMENT STATION, CORPS OF ENGINEERS
P. O. BOX 631
VICKSBURG, MISSISSIPPI 39180

IN REPLY REFER TO: WESYV

19 August 1977

SUBJECT: Transmittal of Technical Report D-77-9

TO: All Report Recipients

1. The report transmitted herein represents the results of one of the research efforts (work units) initiated to date as part of Task 2C (Containment Areas Operations Research) of the Corps of Engineers Dredged Material Research Program (DMRP). Task 2C is included as part of the Disposal Operations Project of the DMRP which among other considerations includes research into the various ways of improving the efficiency and acceptability of facilities for confining dredged material on land.

2. Confining dredged material on land is a relatively recent disposal alternative to which practically no specific design or construction improvement investigations (much less applied research) have been addressed. Being a form of a waste product disposal, dredged material placement on land has seldom been evaluated on other than purely economic grounds with emphasis nearly always on lowest possible cost. There has been a dramatic increase within the last several years in the amount of land disposal necessitated by confining dredged material classified as polluted. Attention necessarily is directed more and more to the environmental consequences of this disposal alternative and methods for minimizing adverse environmental impacts.

3. DMRP work units are in progress to investigate and improve facility design and construction and to investigate concepts for increasing facility capacities for both economic and environmental protection purposes. However, the total picture would be incomplete without considering methods for improving the performance of containment areas. To this end the investigation reported herein was accomplished by the U. S. Army Engineer District, Savannah, Soils Section. This group was selected because of the excellent theoretical background of the personnel as well as their practical experience with the design and construction of retaining dikes. Input from other Districts and Divisions was also important in reaching the goal of providing a set of usable guidelines. It is felt that the guidelines presented in

WESYV 15 August 1977
SUBJECT: Transmittal of Technical Report D-77-9

this report may be applied to provide a sound engineering basis for the design and construction of retaining dikes.

4. Guidelines and recommendations are presented in this report for the proper investigation, design, and construction of retaining dikes to aid in assuring that these dikes will be constructed with a minimum of problems and will serve their project requirements. Raising of existing dikes is covered as well as construction of new dikes. Recommendations are based on a survey of past Corps of Engineers design and construction practices for retaining dikes and current state-of-the-art design procedures for construction of earth embankments.

JOHN L. CANNON
Colonel, Corps of Engineers
Commander and Director

Unclassified

SECURITY CLASSIFICATION OF THIS PAGE *(When Data Entered)*

REPORT DOCUMENTATION PAGE

READ INSTRUCTIONS BEFORE COMPLETING FORM

1. REPORT NUMBER: Technical Report D-77-9	2. GOVT ACCESSION NO.
3. RECIPIENT'S CATALOG NUMBER	
4. TITLE *(and Subtitle)*: DESIGN AND CONSTRUCTION OF RETAINING DIKES FOR CONTAINMENT OF DREDGED MATERIAL	5. TYPE OF REPORT & PERIOD COVERED: Final report
6. PERFORMING ORG. REPORT NUMBER	
7. AUTHOR(s): David P. Hammer Edward D. Blackburn	8. CONTRACT OR GRANT NUMBER(s): Interagency Agreement No. WESRF 74-51
9. PERFORMING ORGANIZATION NAME AND ADDRESS: U. S. Army Engineer District, Savannah P. O. Box 889 Savannah, Georgia 31402	10. PROGRAM ELEMENT, PROJECT, TASK AREA & WORK UNIT NUMBERS: DMRP Work Unit No. 2C04
11. CONTROLLING OFFICE NAME AND ADDRESS: Office, Chief of Engineers, U. S. Army Washington, D. C. 20314	12. REPORT DATE: August 1977 13. NUMBER OF PAGES: 200
14. MONITORING AGENCY NAME & ADDRESS *(if different from Controlling Office)*: U. S. Army Engineer Waterways Experiment Station Environmental Effects Laboratory P. O. Box 631, Vicksburg, Miss. 39180	15. SECURITY CLASS. *(of this report)*: Unclassified 15a. DECLASSIFICATION/DOWNGRADING SCHEDULE

16. DISTRIBUTION STATEMENT *(of this Report)*

Approved for public release; distribution unlimited.

17. DISTRIBUTION STATEMENT *(of the abstract entered in Block 20, if different from Report)*

18. SUPPLEMENTARY NOTES

19. KEY WORDS *(Continue on reverse side if necessary and identify by block number)*

Containment areas
Dikes (embankments)
Dredged material disposal
Waste disposal sites

20. ABSTRACT *(Continue on reverse side if necessary and identify by block number)*

Past experience has indicated a major problem exists in the area of dike construction for dredged material containment areas. Frequent dike failures have been reported along with problems associated with high maintenance requirements. These problems can usually be traced to inadequate design and construction practices compounded by very poor site conditions. Site conditions will continue to be poor, but this in itself indicates the need for more comprehensive planning and design efforts along with improved construction practices.

(Continued)

DD FORM 1 JAN 73 1473 EDITION OF 1 NOV 65 IS OBSOLETE

Unclassified

SECURITY CLASSIFICATION OF THIS PAGE *(When Data Entered)*

20. ABSTRACT (Continued).

This report presents recommendations for proper investigation, design, and construction of retaining dikes to aid in ensuring that these dikes will be constructed with a minimum of problems and will serve their project requirements. Raising of existing dikes is covered as well as construction of new dikes. Recommendations are based on a survey of past Corps of Engineers design and construction practices for retaining dikes and current state-of-the-art design procedures for construction of earth embankments.

THE CONTENTS OF THIS REPORT ARE NOT TO BE USED FOR ADVERTISING, PUBLICATION, OR PROMOTIONAL PURPOSES. CITATION OF TRADE NAMES DOES NOT CONSTITUTE AN OFFICIAL ENDORSEMENT OR APPROVAL OF THE USE OF SUCH COMMERCIAL PRODUCTS.